

**Bonneville Power Administration  
Fish and Wildlife Program FY99 Proposal**

**Section 1. General administrative information**

**Evaluate The Feasibility And Potential Risks Of  
Restoring Yakima R. Coho**

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**Bonneville project number, if an ongoing project**     9603302

**Business name of agency, institution or organization requesting funding**  
Yakama Indian Nation

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**Business acronym (if appropriate)**     YIN

**Proposal contact person or principal investigator:**

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**Subcontractors.**

<b>Organization</b>	<b>Mailing Address</b>	<b>City, ST Zip</b>	<b>Contact Name</b>
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USFS	3701 Griffin Lane SE 139th Pl	Olympia, WA 98501-2292	Ray Brunson

**NPPC Program Measure Number(s) which this project addresses.**

7.4 K.1

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**NMFS Biological Opinion Number(s) which this project addresses.**

Biological Opinion for 1995 to 1998 Hatchery Operations in the Columbia River Basin (NMFS 1995a); Biological Assessment of 1997-2001 Hatchery Operations of the Proposed Cle Elum Hatchery, December 1995 (BPA 1995); NMFS concurrence letter dated 4/1/96.

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**Other planning document references.**

Wy Kan Ush Me Wa Kish Wit, United States v. Oregon Columbia River Fish Management Plan, Yakima sub-basin plan

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**Subbasin.**

Yakima

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**Short description.**

Test new supplementation techniques to increase natural production and improve harvest opportunities, while maintaining genetic fitness of salmonid populations; and, provide critical knowledge to resource managers throughout the Columbia River Basin.

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**Section 2. Key words**

Mark	Programmatic Categories	Mark	Activities	Mark	Project Types
X	Anadromous fish	+	Construction		Watershed
	Resident fish	+	O & M	+	Biodiversity/genetics
	Wildlife		Production	+	Population dynamics
	Oceans/estuaries	X	Research	+	Ecosystems
	Climate	+	Monitoring/eval.	+	Flow/survival
	Other	+	Resource mgmt	+	Fish disease
			Planning/admin.	X	Supplementation
			Enforcement		Wildlife habitat enhancement/restoration
			Acquisitions		

**Other keywords.**

Fish enhancement/restoration, hatchery/wild interactions, ecological interactions, life history, predation, DNA, stock identification,

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**Section 3. Relationships to other Bonneville projects**

Project #	Project title/description	Nature of relationship
8812001	Yakima/Klickitat Fisheries Project Management	Core Management/Admin Support services for all YIN's YKFP Tasks
8811500	Yakima Hatchery Construction	Final design/construction of needed acclimation facilities/wells for YKFP
9701300	Yakima Cle Elum Hatchery O&M	O&M costs for Cle Elum supplementation and research facilities. Core facility for the YKFP.
9506300	Yakima/Klickitat M&E Program	Covers the diverse M&E needs for the target species which are essential for the success of the YKFP.

8812005	Fish passage video monitoring	Monitors, at Prosser and Roza dams, the adult salmonids returning to the Yakima basin.
9706200	Objectives and strategies for Yakima	Represents the modeling process, for iterative planning for species consistent with the regional assessment of supplementation project.
9603301	Yakima river fall chinook supplementation O&M	Essential for YKFP's all stock initiative for experimental purposes for supplementation
8812008	Fisheries Technician Field Activities	Provides essential technical support to fulfill the diverse needs of the YKFP i.e. M&E support, surveys, juvenile fac. operations, marking, etc.
9506404	Policy/Tech involvement/Planning-YKFP	Supports the required co-manager process for the YKFP.
9506406	Monitoring of supplementation response variables for YKFP	Essential for adequate M&E planning and technical participation as co-managers of the YKFP.
9506402	Upper Yakima species interaction studies	M&E function relative to behavior of multi species within the Yakima Basin for the YKFP. Defines competitive/ecological interactions.
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## Section 4. Objectives, tasks and schedules

### *Objectives and tasks*

Obj 1,2,3	Objective	Task a,b,c	Task
1	Determine the feasibility of re-establishing a sustainable, naturally spawning coho population in the Yakima Basin with sufficient productivity to sustain a meaningful in-basin fishery in most years.	a	Limit risk by testing feasibility in various portions of the basin.
1		b	Gather data relevant to the suitability of environmentally distinct portions of the basin for coho production by the following measures: Ø Inventorying the

			quantity and quality of habitat for coho spawning, incubation and rearing; Ø Estimating the (cont.)
1		b	survival (fry-to-smolt and fry-to-adult) of marked groups of hatchery-reared fry released in inventoried areas; and Ø Estimating the reproductive success (egg-to-fry survival) of returning (cont.)
1		b	hatchery fish spawning in inventoried areas.
1		c	Use the Ecosystems Diagnosis and Treatment computer model to integrate habitat, survival and reproductive success data.
1		d	Develop temporary acclimation/release facilities in those candidate areas which collectively afford an optimal combination of productivity, carrying capacity and life –history diversity.
1		e	Develop marking methods to identify hatchery-reared progeny of Cascade and Yakima-recruit broodstock as juveniles and adults. Develop non-lethal methods of identifying naturally produced juveniles and adults
1		f	Release marked hatchery smolts from acclimation facilities in selected test areas and implement strategic habitat enhancement measures
1		g	At the "sub-drainage" level (e.g., the entire Naches Subbasin), monitor smolt production rate and smolt-to-adult survival for both hatchery-reared and natural fish, and adult recruitment rate for natural fish.
2	Optimize production of naturalized populations of coho with respect to abundance and	a	Employ volitional releases of acclimated smolts, in order to maximize survival, homing fidelity

	distribution		and productivity.
2		b	Implement strategic habitat enhancement measures designed to maximize productivity and life history diversity of coho populations spawning and rearing in targeted areas.
2		c	Develop facilities, procedures and marking methods to estimate the production of wild and hatchery smolts and adults.
3	Minimize adverse impacts of coho reintroduction and supplementation on non-target taxa of concern (NTTOC)	a	Control releases of hatchery coho in terms of release location, the number of fish released, the size of fish released and the time of release (date and diel) to minimize potential impacts to NTTOC
3		b	Experimentally estimate the severity of impacts of direct and indirect predation occasioned by releases of coho smolts on NTTOC
3		d	Identify non-predatory interactions between coho and NTTOC in which coho pose a demonstrable risk to the impacted species.
3		d	Experimentally assess the severity of demonstrated non-predatory risks by conducting replicated experiments in natural stream segments within the area of concern.
4	Limit losses of wild and hatchery smolts to native and exotic predators to levels that do not significantly limit coho production potential.	a	Design and conduct experiments to evaluate the level of predation upon hatchery and naturalized coho smolts and implement prey protection or predator control measures as warranted
5	Establish a distinct Yakima River coho stock with heritable life history traits adapted to the Yakima River Basin.	a	Develop techniques to identify NOR's and develop a reintroduction program that moves from the use of Cascade broodstock, to the use of Yakima returns as broodstock and, ultimately, to the exclusive use of

			NOR's as broodstock.
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5		b	Spawn fish in accordance with YKFP broodstock mating guidelines
5		c	Until viable natural populations have been established in the use natural original-origin adult escapement as broodstock. After viable populations have been established, use less than 50%.
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6	Expand harvest opportunities for treaty Indian and sport fisheries inside and outside of the Yakima River Basin while meeting objectives for genetics, experimentation, natural production and ecological interactions	a	Develop procedures to estimate harvest of wild and hatchery Yakima coho inside the Yakima Basin and in major oceanic and Columbia River fisheries.
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### ***Objective schedules and costs***

<b>Objective #</b>	<b>Start Date mm/yyyy</b>	<b>End Date mm/yyyy</b>	<b>Cost %</b>
1	6/1996	12/2048	30.00%
2	6/1996	12/2048	23.00%
3	6/1996	12/2048	10.00%
4	6/1996	12/2048	10.00%
5	6/1996	12/2048	25.00%
6	6/1996	12/2048	2.00%
			<b>TOTAL 100.00%</b>

### **Schedule constraints.**

NEPA determinations, Unpredictable low brood year, Budget constraints.

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### **Completion date.**

2048

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## Section 5. Budget

### *FY99 budget by line item*

Item	Note	FY99
Personnel	Admin, Biologist, Technicians, Research	\$150,000
Fringe benefits	@ 25.3 %	\$37,950
Supplies, materials, non-expendable property		\$65,000
Operations & maintenance		\$216,550
Capital acquisitions or improvements (e.g. land, buildings, major equip.)	M & E equipment, Rearing facility improvements	\$95,000
PIT tags	# of tags: 0	\$0
Travel	Project oversight, M&E and fish propagation crews, Training	\$35,000
Indirect costs	26.6% 1997 rate	\$140,500
Subcontracts		\$70,000
Other		\$0
<b>TOTAL</b>		<b>\$810,000</b>

### *Outyear costs*

Outyear costs	FY2000	FY01	FY02	FY03
Total budget	\$1,650,000	\$1,750,000	\$1,210,000	\$1,210,000
O&M as % of total	24.00%	26.00%	40.00%	42.00%

## Section 6. Abstract

- a. The operation and maintenance of coho acclimation/hatchery sites. Including the surveying and development of additional acclimation sites. These sites will be developed in strategic areas to optimize fish rearing activities, and in areas determined most productive for successful adult returns.
- b. The YKFP's core objectives are as follows:
  - 1) To test the hypothesis that new supplementation techniques can be used in the Yakima and Klickitat River Basins to increase natural production and to improve harvest opportunities, while maintaining the long-term genetic fitness of the wild and native salmonid populations and keeping adverse ecological interactions within acceptable limits;
  - 2) To provide knowledge about the use of supplementation, so that it may be used to mitigate effects on anadromous fisheries throughout the Columbia River Basin;

- 3) To implement and be consistent with the Council's Fish and Wildlife Program; and
- 4) To implement the Project in a prudent and environmentally sound manner.

c. All activities conducted by the YKFP, are consistent with the NPPC's Columbia River Basin Fish and Wildlife Program ("Program") Measure 7.4K.1.

d. Supplementation is defined as utilizing artificial propagation in an attempt to maintain or increase natural production while maintaining long-term fitness of the target population and while keeping ecological and genetic impacts on nontarget species within specified limits (RASP 1991).

YKFP operations have been designed to test the principles of supplementation. Its experimental design has focused on the following critical uncertainties affecting hatchery production: 1) the survival of hatchery fish after release from the hatchery; 2) the impacts of hatchery fish as they compete with wild populations; and, 3) the effects of hatchery propagation on the long-term genetic fitness of fish stocks.

One of the YKFP's primary objectives is to provide regional resource managers with knowledge regarding these issues, and identify and apply improved methods for carrying out hatchery production and supplementation of natural production. The YKFP's monitoring activities are intended evaluate the relative survival and success of various release groups of supplementation fish and to compare their success with that of naturally produced fish.

e. The expected outcome of the project is to have supplementation fish return as adults in sufficient numbers, and to have a reproductive rate of success that will contribute to the enhancement of the natural populations. The project plans to evaluate several generations of releases to obtain a statistically significant result.

f. Project scientists and managers realize that effective monitoring is the key to a successful adaptive management program. The Yakima coho M&E plan will be modeled after the following spring chinook plan. 1. Quality control will monitor the performance of the facilities and their operators. 2. Product specification attributes to determine whether the fish produced by the project meet goals with respect to: fish health; morphology (size and shape); behavior; and survival. 3. Research monitoring activities will be designed to test the performance treatments of artificially reared fish to compare their performance with naturally reared fish. Research monitoring would include measurements of performance in four main areas:

- o post-release survival (survival from time of release until the fish return to spawn);
  - o reproductive success (number of offspring produced per spawner);
  - o long-term fitness (genetic diversity and long-term stock productivity); and
  - o ecological interactions (population abundance and distribution, growth rates, carrying capacity, survival rates, transfer of disease, and gene flow).
4. Risk containment, and 5. Monitoring of stock status.



## Section 7. Project description

### a. Technical and/or scientific background.

The Yakima Klickitat Fisheries Project is part of a comprehensive effort by the Northwest Power Planning Council, Yakama Indian Nation, Washington Department of Fish and Wildlife, U.S. Bureau of Reclamation, U.S. Forest Service, and the Bonneville Power Administration to protect, mitigate and enhance the anadromous fish populations in the Yakima and Klickitat River basins. These governments and agencies have developed and implemented a long-term strategy to restore the habitat and ecosystem necessary to support the anadromous fish resources in the Yakima River basin and to increase fish production through supplementation.

Earlier fishery and habitat mitigation efforts in the Yakima River Basin include federal legislation to authorize passage improvements (fish screening and adult ladders) at numerous irrigation facilities. Other efforts include measures to enhance Yakima River Basin water resources, which will benefit anadromous fish. In 1984, the Yakima River Basin Water and Conservation Act, Public Law 103-434, authorized such water conservation activities, including improvements to irrigation water delivery systems. The USFS, as well as State and private entities have also conducted habitat improvement activities in the basin.

Some fishery mitigation activities are currently taking place in the basin under the auspices of the Columbia River Fish Management Plan. Current CRFMP-sponsored activities in the basin include programs for both fall chinook and coho. The fall chinook program includes the annual production and release of 1.7 million smolts in to the lower Yakima River. Since 1987, 700,000 early-run coho from the Cascade Hatchery have been released in the basin. In 1995, an additional 600,000 juvenile coho were obtained by the YIN fisheries program for release in the basin. Such mitigation programs have been necessitated by the losses attributed to the development of federal hydroelectric projects.

Historically, the Yakima River carried spring, summer, and fall chinook salmon; sockeye salmon; coho salmon; and summer steelhead. Prior to extensive agricultural development in the Yakima river Basin, the numbers of anadromous fish returning to the Yakima River were estimated to have ranged from 600,000 to as many as 960,000 per year (Bryant and Parkhurst, 1950; USBR and USFWS, 1976; YIN et al., 1990). The Table below sets forth a comparison of the estimated historical fish runs (by species/race) with recent run size averages.

#### **Estimates of Historical Anadromous Fish Runs in the Yakima River as Compared to Recent Run Size (5-year average, 1989-1994). (Fast, EIS, 1994)**

<b>Species/Race</b>	<b>Pre-1900 Run</b>	<b>Recent Average</b>
Fall Chinook	132,000	1,200
Spring Chinook	200,000	3,800
Summer Chinook	68,000	0
Coho	110,000	240
Summer Steelhead	80,500	1,100
Sockeye	200,000	0

Wild sockeye and coho salmon are now extinct; the handful of sockeye and coho salmon now present in the Yakima River Basin are the result of strays from other Columbia River watersheds or hatchery plants of nonlocal fish into the Yakima River. They have not established naturalized populations in the Yakima River. Summer chinook are believed to be extinct, but this has not been confirmed. Spring and fall chinook salmon and summer steelhead are present, but at a fraction of their original numbers. The 1989-1994 5-year mean annual return of salmon and steelhead to the Yakima River system is approximately 6,300 adults (less than 1 percent of the historical run size).

Planned by the Council since 1982 and included its Columbia River Basin Fish and Wildlife Program (“Program”) as Measure 7.4K.1, the YKFP’s operation is calculated to compensate for losses from development and operation of hydroelectric projects elsewhere in the Columbia Basin. Project development has been subject to the NMFS Biological Opinion for 1995 to 1998 Hatchery Operations in the Columbia River Basin (NMFS 1995a) and BPA’s Biological Assessment of 1997-2001 Hatchery Operations of the Proposed Cle Elum Hatchery, December 1995 (BPA 1995), which was concurred to by NMFS in its letter dated 4/1/96. See YKFP Final EIS, January 1996.

It is the Council’s intention that the YKFP will help determine the role that supplementation might play in increasing natural production of anadromous salmonids throughout the Columbia Basin. The YKFP is designed to test the hypothesis that success of supplementation can be improved by rearing fish under more natural conditions in the hatchery (substrate, cover, structure, natural feeding, predators, etc) and by following genetic guidelines to minimize differences between the supplementation fish and the naturally reared fish. Preliminary research projects on the naturalized rearing have been conducted by NMFS and WDF&W scientists to determine the appropriate treatment variables to be tested in the large scale production experiments that the YKFP is conducting.

**b. Proposal objectives.**

The Project managers have agreed on a set of objectives and strategies for supplementing each of the Yakima River Basin stocks. Since the Project’s inception, these objectives and strategies have been reviewed (i.e. critical peer review) and revised. The objectives and strategies are precise and increasingly specific statements about the YKFP in four

categories: genetics, natural production, experimentation, and harvest, while taking steps to contain unacceptable genetic and ecological risks.

Quantitative production objectives (for most of the seven stocks originally identified to be supplemented as part of the YKFP) were formulated in 1990 in the Refined Goals section of the Preliminary Design Report (BPA, 1990b). The Refined Goals objectives were based on computer simulations generated by the Council's System Planning Model.

Project objectives are continually re-assessed in the light of the latest demographic data, suspected ecological relationships, and modeling tools. Quantitative production objectives for upper Yakima coho are being refined, based on computer simulations using the Ecosystem Diagnostic and Treatment Planning Model (EDTPM) (Lestelle et al., 1994) developed under the Regional Assessment of Supplementation Project (RASP, 1992). BPA and the project managers have used the EDTPM for YKFP planning rather than the System Planning Model, because it tracks juvenile production capacity more closely and allows for variable (density-dependent) predation on outmigrating smolts.

Note that these preliminary supplementation strategies and production objectives are based on modeled assumptions, not on empirical data. The assumptions underlying the computer analyses represent a reasonable synthesis of what is known at present about the natural production and post-release survival of coho in the Yakima. Future and ongoing risk analysis and ecological research would be expected, through the normal operation of the annual planning and implementation cycle, to result in refinements to supplementation strategies and perhaps to objectives as well.

### **c. Rationale and significance to Regional Programs.**

The Yakima Klickitat Fisheries Project is part of a comprehensive effort by the Northwest Power Planning Council, Yakama Indian Nation, Washington Department of Fish and Wildlife, U.S. Bureau of Reclamation, U.S. Forest Service, and the Bonneville Power Administration to protect, mitigate and enhance the anadromous fish populations in the Yakima and Klickitat River basins. These governments and agencies have developed and implemented a long-term strategy to restore the habitat and ecosystem necessary to support the anadromous fish resources in the Yakima River basin and to increase fish production through supplementation.

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#### **d. Project history**

The Yakima Klickitat Fisheries Project (“YKFP or Project”) was first approved by the Northwest Power Planning Council (“NPPC or Council”) in 1982. At that time, the Council envisioned the Project as a cluster of production facilities in both the Yakima and Klickitat River Basins designed to enhance the fishery for the Yakama Indian Nation (“YIN”) and other harvesters. The development of the Project’s master plan began in 1985. By that time, however, the Council had modified the purpose of the Project to include research activities testing the assumption that new supplementation methods could increase natural production while protecting the genetic resources common to the river basins. The Council also determined that the principles of adaptive management, which encourages an affirmative pro-active response to research discoveries, were to be utilized by the resource managers selected to manage the YKFP. These managers are the YIN and the Washington Department of Fish and Wildlife (“WDFW”).

As recommended and directed by the Council, the Project’s master plan, which included a supplementation research program, was conceived and developed. On October 15, 1987, the Council approved the YKFP’s master plan, which included the construction of the production and acclimation facilities in the Upper Yakima River Basin commonly referred to as the Upper Yakima Supplementation Complex (“UYSC or Complex”). Consistent with the NPPC’s Columbia River Basin Fish and Wildlife Program (“Program”) Measure 7.4K.1, the Project’s Preliminary Design Report was completed in 1990. At that time, an Environmental Assessment (EA) was prepared for YKFP construction activities and facility operations throughout the Yakima and Klickitat River Basins.

In 1992, the Project began the process of preparing an Environmental Impact Statement (“EIS”). During the EIS’s preparation period, the Council endorsed the manager’s proposal to “tier” the Project’s production and research activities by bringing them on-line in gradual stages. The first phase (tier) targeted the supplementation of depressed populations of upper Yakima river spring chinook. This initial phase also included research designed to determine the feasibility of re-establishing a naturally spawning population and a significant fall fishery of coho salmon in the Yakima Basin. Future phases of the YKFP include the supplementation of fall chinook and steelhead, and a reintroduction of now extirpated stocks. Also envisioned for the Project’s future is the introduction of supplementation to the Klickitat Basin, which could include the use of the Klickitat Hatchery, a Mitchell Act facility now operated by WDFW.

By design, the supplementation of summer steelhead and fall chinook populations in the Yakima basin was not detailed in the initial EIS. Research activities focused upon the Klickitat River fisheries also fell outside its scope. However, they remain essential components of the Project. At this time, fall chinook, steelhead and the Klickitat basin are the subjects of on-going research activities designed to determine whether the YKFP

will support the introduction of additional anadromous fish stocks into its production and research programs.

The Project's EIS was completed in 1996, and the Record of Decision ("ROD") was signed by BPA's Administrator and Chief Executive Officer, Randall W. Hardy, on March 13, 1996. With the completion of the EIS and the signing of the ROD, construction of the YKFP's Cle Elum Supplementation and Research Facility ("Cle Elum Facility") began in May of 1996. The Cle Elum Facility was completed on August 1, 1997. The UYSC also includes three acclimation facilities to be constructed in the Upper Yakima basin. Thus far, the YIN, as the Project's Lead Agency and the UYSC's operator, has captured 240 adult spring chinook at the Roza adult collection facility. Egg taking and fertilization procedures were performed in September 1997. 450,000 eggs were fertilized and incubated at the facility. Funding for the continued operation and maintenance of the UYSC has been approved by the Council and included in Program Measure 7.4K.1.

Earlier YKFP project numbers included under the Council's Fish and Wildlife plan are as follows:

82-016 -	YAKIMA RV. SPRING CHINOOK ENHANCEMENT STUDY - YIN
85-062 -	PASSANGE IMPROVEMENT EVALUATION - BPNL
86-045 -	YAKIMA HATCHERY PRE-DESIGN - CLE ELUM PROJECT -
NMFS	
86-101 -	FILMING FOR PROJECT RECORD - MOVING PICTURES INC.
87-135 -	YAKIMA HATCHERY - MASTER PLAN DEVEL - YIN
87-136 -	YAKIMA HATCHERY - WAPATO CANAL PEN REARING - YIN
87-414 -	YAKIMA ANADROMOUS FISH A/V - JOHN CAMPBELL
88-120 -	YAKIMA NAT. PROD. & ENHANCEMENT PROG. - YIN
88-120-01 -	YAKIMA/KLICKITAT FISHERIES PROJECT MGMT. - YIN
88-120-02 -	YAKIMA ENGINEER ASSISTANCE - YIN
88-120-03 -	YAKIMA SPECIES INTERACTION - YIN
88-120-04 -	HATCHERY TRAINING AND EDUCATION - YIN
88-120-05 -	FISH PASSAGE VIDEO MONITORING - YIN
88-120-06 -	YAKIMA FISHERIES TECHNICIANS - YIN
88-120-07 -	YAKIMA SPRING CHINOOK NATURAL PROD. - YIN
88-120-08 -	FISHERIES TECHNICIAN FIELD ACTIVITIES - YIN
88-120-09 -	STEELHEAD AND FALL CHINOOK PROD. OBJECTIVES - YIN
88-123 -	YAKIMA HATCHERY COORDINATION - ROZA IRRIGATION
DISTRICT	
88-149 -	YAKIMA HATCHERY - WATER ANALYSIS - BOR
88-167 -	YAKIMA HATCHERY ECONOMIC STUDY - CWU
89-082 -	YAKIMA HATCHERY - EXPERIMENTAL DESIGN - WDFW
89-083 -	YAKIMA HATCHERY - EXPERIMENTAL DESIGN - WDFW
89-089 -	YAKIMA/KLICKITAT RADIO TELEMENTRY STUDY - NMFS
89-100 -	YAKIMA HATCHERY ENVIRONMENTAL ASSESS. REVIEW -
BPNL	
89-105 -	YAKIMA - SPECIES INTERACTION STUDY - WDFW
90-058 -	YAKIMA HATCHERY - PROJ. LEADER FUNCTION - SAMPSEL
CONS.	

90-062 -	CLERICAL SERVICES-YAKIMA PROJECT - PENNYS FROM
HEAVEN	
90-065 -	CHANDLER JUVENILE TRAP CALIBRATION - NMFS
90-069 -	YAKIMA HATCHERY - FINAL DESIGN - CH2M HILL
90-045 -	YAKIMA ADULT/JUVENILE TRAPPING FINAL DESIGN - BOR
91-048 -	EVAL. OF ENV. IMPACTS OF YAKIMA PROD. PROG. - BPNL
91-055 -	SUPPLEMENTATION FISH QUALITY (YAKIMA) - NMFS
91-059 -	FOOD ABUNDANCE YAKIMA RV TROUT, STLHD, CHINOOK -
CWU	
92-021 -	EXPERIMENTAL DESIGN DEVELOPMENT - CWU
94-037 -	YAKIMA BIO SPEC INTERFACE - HATCHERY OP CONSULTING
94-036 -	ECONOMIC IMPACT ANALYSIS YAKIMA RV BASIN - CWU
94-040 -	QUANTITATIVE PROD. OBJ. FOR YAKIMA FALL CH. & STLHD -
MOBRAND	
95-055 -	UPDATE OF YAKIMA FISH PROJECT ECONOMIC ANALYSIS -
CWU	
95-062 -	YAKIMA/KLICKITAT FISH. PROJECT ADAPT. MGMT. -
95-063 -	YAKIMA/KLICKITAT MONT. AND EVAL. PROGRAM -
95-064 -	YAKIMA FISHERIES PROJECT SCI. MGMT SERVICES - WDFW
95-064-01 -	REFINEMENT OF MARKING METHODS FOR YKFP - WDFW
95-064-02 -	UPPER YAKIMA RIVER SPECIES INTERACTION STUDIES - WDFW
95-064-03 -	GENETIC MGMT. FRAMEWORK FOR YAKIMA SP. CHINOOK - WDFW
95-064-04 -	POLICY/TECHNICAL INVOLVEMENT AND PLANNING - WDFW
95-064-05 -	FURTHER DEVEL. OF NIT/LNIT REARING STRATEGY FOR YKFP -
WDFW	
95-068 -	KLICKITAT PASSAGE/HABITAT PRELIMINARY DESIGN - YIN

#### **BONNEVILLE PROJECT SPECIFIC SUPPORT**

88-034 -	ENGINEERING SUPPORT --YAKIMA HATCHERY (also 92-029, 91-
080) - BPA	
88-115 -	YAKIMA HATCHERY CONSTRUCTION - BPA
89-042 -	ENGINEERING SERVICES PREL. DESIGN S&S FACIL -
89-043 -	YAKIMA HATCHERY - PRELIMINARY ENGINEERING -
89-093 -	BPA CONSTRUCTION SUPPORT FOR YAKIMA HATCHERY - BPA
93-081 -	BPA LANDS SUPPORT FOR YAKIMA HATCHERY - BPA
95-037 -	SUPPORT FROM FACILITIES DESIGN - BPA
95-038 -	SUPPORT FROM CONSTRUCTION SERVICES - BPA
95-040 -	SUPPORT FROM REAL ESTATE - BPA
95-061 -	SUPPORT FOR ENVIRONMENTAL ANALYSIS -
95-069 -	YAKIMA/CLE ELUM LAND PURCHASE -

A summary of Project reports and technical papers can be found in the YKFP's Final EIS (January 1996). All major research results are include in those reports. Hardcopies of these reports are in the possession of BPA's Fish and Wildlife Program.

Because the YKFP is attempting to mitigate for effects on declining natural resources in a complicated, large-scale ecosystem without a full understanding of its complexities, the Project managers believe the principles of adaptive management to be particularly appropriate tools. By incorporating them into the Project's scientific method, the

managers expect to achieve Project goals while protecting the basin's fishery resources from unforeseen, adverse Project impacts.

In applying adaptive management, actions by YKFP managers will respond to a set of agreed-upon objectives. These actions are designed as experiments to test hypotheses regarding their outcome: to see whether the predicted result occurs or whether some other result occurs. Carefully designed to obtain valid (i.e., statistically reliable) results, the experiments are conducted, monitored and evaluated to allow statistical evaluation of the results. New experimental insights are used to modify or discard ineffective strategies, to improve underlying theory and, when necessary, to revise objectives to conform with perceived possibilities. Informed Project scientists and managers may modify programs, procedures, and facilities in response to these findings, even if it means drastic changes to a program. Thus risks to the ecosystem are realized and addressed in the Project's annual planning cycle (described in detail below), which will annually examine the capacity and constraints of the stock and stream system, as well as the performance of hatchery fish, testing and revising a theory of supplementation. The rearing and release of each new group of smolts will represent an experimental test of the latest revision of the theory.

#### **e. Methods.**

Project scientists and managers realize that effective monitoring is the key to a successful adaptive management program. It enables them project managers to determine whether an action achieved its objective, or whether the objective was properly developed. Monitoring should also provide insight into the actual result of an action as well as explain the success (or lack) in achieving the predicted result.

The YKFP's Coho PSR lays out an integrated multi-level monitoring program for supplementing Yakima coho. This structure ensures that strategies are implemented as intended, that experimental studies produce reliable results, and that risks associated with unresolved uncertainties are contained. It also ensures efficiency, prevents duplication of effort, and tracks progress toward meeting objectives.

Since monitoring activities for these categories overlap, they will be developed into an integrated monitoring plan. The monitoring plan would be revised and expanded as part of the adaptive management process. The project's monitoring plan, which will be used as a template for future production activities, addresses the following five monitoring categories:

1. Quality control will monitor the performance of the facilities and their operators. Standards would be developed for all fish culture and data collection activities as part of the certification process required for the facilities. Monitoring procedures would be included in the operations manuals for all facilities and field activities.

2. Product specification attributes will be monitored at the to determine whether the fish produced by the project meet goals with respect to: fish health; morphology (size and shape); behavior; and survival.

3. Research monitoring activities Research monitoring would include measurements of performance in four main areas:

- o post-release survival (survival from time of release until the fish return to spawn);
- o reproductive success (number of offspring produced per spawner);
- o long-term fitness (genetic diversity and long-term stock productivity); and
- o ecological interactions (population abundance and distribution, growth rates, carrying capacity, survival rates, transfer of disease, and gene flow).

4. Risk containment consists of a monitoring plan developed to evaluate four categories of interest identified in the risk analysis to monitor risk containment: 1) experimental; 2) genetic; 3) harvest; and, 4) natural production/ecological interactions. These four areas relate back to the objectives and strategies. The risk analysis defines risk in terms of the probability of failure to meet the objectives of the project for these four categories.

5. Monitoring of stock status includes measurements of run size and escapement to determine whether harvest objectives can be met without affecting natural production. It would provide information essential to track the long-term performance and fitness of the fish populations.

Implementation of the monitoring plan, annual review of the findings, and subsequent adjustment, as necessary, of the supplementation program objectives, strategies, assumptions, uncertainties, and risk analysis would complete the feedback loop that is essential to the success of the adaptive management process, and ultimately, the entire project.

#### **f. Facilities and equipment.**

The facilities designed to enable the YKFP's restoration and production activities include Prosser Tribal Hatchery, Marion Drain Tribal Hatchery, Chandler Juvenile Facility, and various acclimation ponds at strategic sites in the Yakima Basin. Earlier fishery and habitat mitigation efforts in the basin include fish passage improvements at numerous irrigation facilities. In addition, the Yakima River Basin and Conservation Act, Public Law 103-434 (1994), authorizes the dedication of water conserved as a result of federally funded improvements to irrigation facilities and practices to enhance instream flows.

Facilities needed for the Yakima coho experimental program include those for adult capture, holding and spawning, egg incubation, juvenile rearing, acclimation, release, and monitoring.



Facilities will be required for fish originating from both in-basin and out-of-basin broodstock.. Existing adult coho trapping may be used to collect in-basin broodstock.

Existing ponds, side channels, and irrigation ditches in the Yakima basins are being investigated for this supplementation purpose. Sites are evaluated based on their biological suitability, accessibility, water supply dependability, water supply quality, and cost of site development. Each will require fish containment apparatus, water flow control structures, avian and mammalian predator protection, and a discharge channel from the rearing area to the river allowing safe smolt passage.

Monitoring facilities will be identified through the development and implementation of the URP. They will meet the needs of the five levels of monitoring needed for the project and follow the hatchery practices, fish health, ecological interaction, and genetic policy guidelines developed by the Integrated Hatchery Operations Team (IHOT) and endorsed by tribal, state, and federal resource managers.

Descriptions of specific project facilities and equipment follow:

#### **Acclimation sites**

**Fish culture equipment** - feed buckets, feed scoops, boots, rain gear, scales, sample nets, dip nets, dissolved oxygen meters, and thermometers are among the equipment to be used.

**Alarm systems** - alarm systems will sense low water levels and low flow conditions, then send signals via radio frequencies to an auto dialer which will notify personnel of the alarm status.

**Hand tools** - necessary tools include shovels, hand saws, hammers, wrenches, sledges, rakes, drills, skill saws, small portable generators, cell phones, etc.

**Barrier nets** - nets used to contain fish will be sized to meet the conditions at each site. They will be installed at an angle to the flow to maximize the net surface area. Trash nets will have a 1" mesh size, coho barrier nets will have a 1/2" mesh size, and fry barrier nets will have a 3/32" mesh size. Nets will have heavy weights attached to their lead lines and will be well anchored to the ground on the surface to prevent blowouts.

**Screen structures** - sites requiring screen structures will be built to meet the WDFW screen requirements. Screens will be sloped to allow for easy cleaning and to increase surface area.

**Predator control** - bird netting will cover suitable sites and wire mesh fencing will be added as needed.

**Flow control** - sites which do not have a means of controlling the amount of flow entering the rearing area will require removable structures constructed of sand bags and pipe. They will be located upstream of the barrier nets.

**Vehicles** - a variety of vehicles will be utilized for the project, including full size pick-ups and light trucks.

#### **Hatcheries**

**Water intake screens** - sloped screen intakes will supply water to the facilities. The screens will meet WDFW criteria for approach velocity and screen mesh size.

**Water supply pumps** - low head pumps will supply rearing and incubation water. Multiple pumps per site will provide a safety back up. Generators with automatic transfer switches will provide power during outages. The pump and generator size will be site dependent.

**Incubators** - fiberglass, deep tough incubators will incubate eggs and serve as first feeding units. Water and space will also be available for the installation of bucket incubators for individual females.

**Rearing ponds** - the main rearing units will be vinyl lined ponds, measuring 150' long, 50' deep, with a 4' water depth (22,000 cft). They will have sloped, concrete screen structures at the downstream end and a pipe manifold across the front end. They will be covered with predator netting. Each pond will be capable of holding up to 400,000 coho smolts.

**Office equipment** - computers, printers, telephones, fax machines, radios, microwaves, refrigerators, sleeping bunks, desks, chairs, and file cabinets are needed. Provisions will be made to allow overnight stays in the office during storm events.

**Fish waste cleaning system** - a vacuum will be generated by a high pressure pump and a venturi nozzle. Pipelines throughout the sites will allow attachment of cleaning heads to the vacuum system. Wastes will be removed from the rearing unit bottoms and stored in a waste pond.

### **Monitoring and Evaluation**

**Screw traps** - portable traps to monitor migratory in-basin natural and hatchery production. Used to collect samples for stomach analysis and demographic data.

**Snorkel equipment** - used for visual monitoring of species habitat preference, ecological interactions, growth rates, adult carcass retrieval.

**Beach seines** - used to sample study reaches in order to collect demographic data on species of concern.

**Rafts** – used to access remote acclimation sites, and to conduct spawning ground surveys.

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## **Section 8. Relationships to other projects**

The coho enhancement activity is a critical project under the YKFP. The goal is to re-establish a self sustaining coho population in the Yakima basin. The project includes supplementation by acclimation, broodstock collection, and monitoring of coho populations.

The success of the acclimation projects requires collaboration from the following projects: Yakima Phase 2 Screen Fabrication (9105700), vital to species control within basin from straying into irrigation diversions. Yakima Screen-Phase II-O&M (9200900). Maintains the irrigation diversion screens. Yakima-Phase 2 Screens-Construction (9107500) , O&M of Yakima Fish protection, Mitigation and Enhancement (9503300). Both are vital to the success of the YKFP by maintaing irrigation screens. Teanaway Instream Flow Restoration (9704900), essential tributary enhancement for the YKFP. Satus Watershed Restoration(9603501), improves tributaries within the Yakima basin, which is vital to the coho supplementation.

The four treaty tribes of the Columbia River have made coho restoration a priority as stated in the Tribal Recovery Plan, *Wy Kan Ush Me Kush Wit*. The Umatilla and Nez Perce tribes have implemented coho recovery plans under the FWP. The Umatilla Tribe has four coho BPA contracts that relate to restoration. *Umatilla Hatchery Satellite Facility Construction* (910 1400) involves construction of a coho acclimation pond in of 1998 on the Umatilla River. The O&M for this facility is funded by *Umatilla Hatchery*

*Satellite Facility O & M* (834 3500). The Umatilla Tribe will be monitoring natural production/ecological interactions under *Evaluation of Natural Production in the Umatilla River* (900 0501) which is the monitoring program for the Umatilla Hatchery which includes coho. Finally, adult coho returning to the Umatilla River Basin will be included in the Tribe's trap and haul program at Three Mile Dam under BPA contract *Umatilla Basin Trap and Haul* (880 2200).

The Nez Perce Tribe (NPT) has placed a high priority on coho restoration in the Snake River Basin. They are implementing a plan for "Reintroduction of *Cuhlui* (coho salmon) in the Clearwater River basin". The NPT goal is "to reintroduce and restore coho salmon to levels of abundance and productivity sufficient to support sustainable runs and annual harvests".

## **Section 9. Key personnel**

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WAPATO, WASHINGTON 98951  
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### **EXPERIENCE:**

**2/93-PRESENT POLICY ADVISOR/PROJECT COORDINATOR  
Yakima/Klickitat Fisheries Project  
Yakama Indian Nation  
Toppenish, WA 98948**

**1989-1992 PRESIDENT  
-Melco Petroleum Inc., Wapato, WA 98951  
\*Wholesale fuel distribution  
VICE-PRESIDENT  
-Yakima Petroleum Inc., Wapato, WA 98951  
\*Wholesale fuel distribution  
-Eagle Stop and Save, Inc.  
\*Fuel-convenience stores  
-Yakima Solutions Inc., Wapato, WA 98951  
-Native Solutions Inc., Wapato, WA 98951  
\*Consulting and Business Management**

**1985-1989 CHAIRMAN, YAKAMA TRIBAL COUNCIL**

**1971-1989 YAKAMA TRIBAL COUNCIL (ELECTED)  
Committees served:  
-Timber, Grazing, Overall Economic Development**

	<ul style="list-style-type: none"> <li>-Loan, Extension, Education, and Housing</li> <li>-Legislative</li> <li>-Health, Employment, Welfare, Recreation, and</li> </ul>
<b>Youth Activities</b>	<ul style="list-style-type: none"> <li>-Budget and Finance</li> <li>-Executive Board</li> <li>-Enrollment</li> <li>-Special Tax Committee</li> <li>-Radio Active/Hazardous Waste</li> <li>-Public Relations/Media</li> <li>-While serving on the Tribal Council for 18 years, I</li> </ul>
<b>served as</b>	<b>Chairman at one point of the</b>
<b>listed committees</b>	
<b>1971</b>	<b>TRIBAL PLANNER</b>
<b>1969-1970</b>	<b>ASSISTANT MANAGER</b> <b>PERSONNEL MANAGER</b> <ul style="list-style-type: none"> <li>-White Swan Industries</li> <li>-Wholesale Furniture Manufacturing</li> </ul>
<b>1968-1969</b>	<b>RESIDENT COUNSELOR</b> <ul style="list-style-type: none"> <li>-Fort Simco Job Corps</li> <li>-Worked nights, commuted to CWSU during day</li> </ul>
<b>1967-1968</b>	<b>MANAGER TRAINEE</b> <ul style="list-style-type: none"> <li>-White Swan Industries</li> <li>-Wholesale Furniture Manufacturing</li> </ul>
<b>1965-1967</b>	<b>Industrial injury, not employed</b>
<b>1961-1965</b>	<b>STUDENT</b> <ul style="list-style-type: none"> <li>-Lower Columbia College, Longview, WA</li> <li>-While attending college, worked full time at night</li> </ul>
<b>in a lumber</b>	
<b>grader.</b>	<b>planner mill in various jobs, including lumber</b>
<b>1959-1961</b>	<b>-U.S. Army, Active Service</b>
<b>1956-1959</b>	<b>VARIOUS JOBS</b> <ul style="list-style-type: none"> <li>-Fisherman</li> <li>-Boeing Aircraft Company</li> <li>-Construction</li> <li>-Farm Labor</li> </ul>

## **EDUCATION:**

**American Indian Management Institute, Albuquerque, NM**  
-Completed six-week comprehensive studies on Tribal Executive Development  
**Central Washington State College, Ellensburg, WA**  
-Major: Sociology Minor: Psychology, Business  
**Lower Columbia College, Longview, WA**  
-Business Major  
**Lower Columbia College, Longview, WA**  
-Associate Degree in Electronics, 1963  
**White Swan High School, White Swan, WA.**  
-Graduate, 1956

## **ORGANIZATION AFFILIATES:**

-Lifetime member, National Congress of American Indians  
-Member, Fraternal Order of Eagles No. 2225, Toppenish, WA  
-Founder, member, past Chairman, Northwest Portland Area Indian Health Board,  
Portland, OR. (18 years)  
-Member, past Chairman, National Indian Health Board, Denver, CO (16 years)  
-Served as a member, Indian Food & Nutrition Board, Denver, CO (3 years)  
-Served, Yakima Valley College Board of Trustee, Yakima, WA (2 years)  
-Served as member, founder, Heritage College Board of Trustees, Toppenish, WA  
-Served on Advisory Board, Master of Public Health, University of California at Berkeley, CA. (2 years)  
-Served on, Inter-Mountain School Board, Provo, UT (2 years)  
-Member, President, Yakama Indian Rodeo Assoc., (25 years, volunteer )  
-Member, founder, past President, Western States Indian Rodeo Assoc. (20 years)  
-Member, founder, current President, Indian National Finals Rodeo, Inc.,(22 years)  
-Served as member, Special Yakima Rodeo Board, to produce, promote the National High School Rodeo Finals in Yakima, WA. in 1980.  
-Served on "The Advisory Panel on Alternative Means of Financing and Managing

**Radioactive Waste Facilities", Administrative Appointee,  
Depart. of Energy, 1984.**

**RECOGNITIONS:**

- Yakama Indian Nation, Supervisor of the Year, 1995.**
- Board Member of the year, Northwest Portland Area Indian Health Board,  
4 times.**
- Board Member of the year, National Indian Health Board, 2 times.**
- Special Recognition of Appreciation as a Founder of Western States Indian Rodeo Association on their Tenth Anniversary.**
- Special Recognition as a Founder of the Indian National Finals Rodeo from the American Revolution Bicentennial, 1776-1976.**
- National Indian Rodeo Man of the Year, 1978, Hoof and Horns Magazine.**
- National Indian Man of the Year, American Indian Heritage Foundation,  
Washington, D.C., 1988.**

**MILITARY EXPERIENCE:**

**1959-1965 VETERAN, United States Army, Honorable Discharge, SGT E-5.**

**PERSONAL DATA:**

**Date of Birth: April 20, 1938  
Tribe: Yakama, Enrollment # 4059  
Marital Status: Married, 5 daughters, 1 son**

**HOBBIES AND INTERESTS:**

**-Hunting, Fishing, Horses, Sports, Crafts, & Rodeo**

**REFERENCES:**

**-Submitted upon request**

**DAVID E. FAST**

Fisheries Resource Management  
P.O. Box 151  
Toppenish, Washington 98948

Work: 509-966-5291

## ***Education***

University of Washington, Seattle, Washington  
Doctor of Philosophy in Fisheries Science, 1987.

University of Puerto Rico, Mayaguez, Puerto Rico  
Master of Science in Marine Sciences, 1974.

St. John's University, Collegeville, Minnesota  
Bachelor of Science in Zoology, 1969.

## **Research Experience**

**1988-Present: Research Manager. Fisheries Resource Management Program, Yakima Indian Nation.** Responsible for the design, development, and implementation of a major supplementation and research facility to test the concept of using artificial production to rebuild natural spawning populations of spring chinook salmon in the Yakima Basin. Write detailed project plans, develop short and long-term project goals and objectives, and supervise professional and technical staff.

**1985-1988: Project Leader. Spring Chinook Enhancement Study.** Responsible for research project designed to determine the best methods of enhancing the spring chinook salmon population in the Yakima Basin. Evaluate survival through various life stages and total production of naturally producing salmon. Determine methods of supplementation with hatchery reared fish while minimizing adverse genetic impacts.

Fast, D.E. 1987. The Behavior of salmonid alevins in response to light, velocity and dissolved oxygen during incubation. Pages 84-92 in Salmonid Migration and Distribution Symposium (E.L. Brannon, ed.), School of Fisheries, University of Washington, and Directorate for Nature Management, Norway, Trondheim, Norway.

Fast, D.E., J.D. Hubble, T.B. Scribner, M.V. Johnston, W.R. Sharp. 1989. Yakima/Klickitat Natural Production and Enhancement Program. 1989 Annual Report to Bonneville Power Administration. Project 88-120. 107 pp.

Fast, D.E. 1989. Supplementation Strategies For The Yakima/Klickitat Production Facility. Pages 143-147 in Northwest Fish Culture Conference Proceedings (R.Z. Smith, ed.).

Fast, D.E., J.D. Hubble, M.S.Kohn, and B.D.Watson. 1991. Yakima River Spring Chinook Enhancement Study. Project Completion Report to Bonneville Power Administration. Project 82-16. Volume 1 - 345 pp. and Volume 2 (Appendices) 133 pp.

## RESUME

Name: William H. Fiander  
Address: P.O. Box 86  
Harrah, WA 98933  
Telephone: (509)848-3456  
Marital Status: Married  
Dependents: Two Daughters  
D.O.B.: 3/26/52  
S.S.#: 531-56-5568  
Enrollment #: Yakama Nation #4264

### EDUCATION:

90-92 Bachelor of Science Degree in Biology, Central Washington University,  
Ellensburg., Washington  
73-77 Bachelor of Arts Degree in Anthropology and Bachelor of Arts Degree in  
Native American Studies, Central Washington University,  
Ellensburg., Washington  
71-73 General Studies, Yakima Valley Community College, Yakima,  
Washington  
70-71 General Studies, Wenatchee Valley Community College, Wenatchee,  
Washington  
66-70 High School Diploma, White Swan High School, White Swan,  
Washington

### TRAINING:

96 Northwest Fish Culture Conference, Victoria, B.C.  
College of Southern Idaho Sturgeon Workshop  
U.C. Davis Sturgeon Workshop  
Pacific Northwest Fish Health Protection Committee Meeting  
San Diego, California  
95 Fish Genetics, Anchorage, Alaska  
94 Northwest Fish Culture Conference  
OJT Northwest Indian Fisheries Commission  
Pacific Northwest Fish Health Protection Committee



- International Symposium of Aquatic Animal Health, Seattle, Washington
- Cold Water Fish Culture Course, Bozeman, Montana
- 93 Native American Fish & Wildlife Society Pacific Region Conference
- Laboratory Technician Workshop, Olympia, Washington
- Western Fish Disease Workshop, Port Townsend, Washington
- Organosomatic Workshop, Wenatchee, Washington
- 92 Fish Health Short Course, Gresham, Oregon

#### WORK EXPERIENCE:

- 96-97 Supervised Marion Drain Hatchery
- 94-97 Supervised K-Basin Projects- Fall Chinook, Sturgeon, Rainbow Trout
- Supervised Yakima Basin Fall Chinook Acclimation Project
- Supervised Yakima Basin Coho Acclimation Project
- Supervised Prosser Tribal Hatchery
- 92-97 Supervised BPA Training and Education Program
- 92 Reclassified to Biologist I
- 90-92 Reclassified to Trainee Progression
- 89-90 Tech IV- Spawning Grounds Survey, Fish Traps, Electro-Shocking
- 85-89 Tech III- Spring Chinook Enhancement Study, Reservation Fish Study,
- Spawning Grounds Survey, Fish Traps, Electro-Shocking
- 84-85 Tech II- Spring Chinook Enhancement Study
- 83-84 Tech I- Spring Chinook Enhancement Study

#### PUBLICATIONS:

- 1997 Yakama/Klickitat Natural Production and Enhancement Program
- Training and Education Task Order 4.0
- Annual Report CY 1997
- Prepared by Melvin R. Sampson and William Fiander
- 1996 Yakama/Klickitat Natural Production and Enhancement Program
- Training and Education Task Order 4.0
- Annual Report CY 1996
- Prepared by Melvin R. Sampson and William Fiander
- 1975 "Collecting Historical Artifacts," by William Fiander
- Printed for Resources Development Internship Program
- Western Interstate Commission for Higher Education

**Joe Blodgett**, YIN Production Biologist. FTE Supervises all fish propagation activities for the project. Develops facility needs, O & M budgets, and biological criteria for all fish rearing operations with the project.

#### **EDUCATION**

**1994-1997** Central Washington University  
Bachelor of Science  
Major: Fish Biology

**1989-1992** Mt. Hood Community College  
Associate of Applied Science  
Major: Fishery Techniques

## **EXPERIENCE**

**6/97-Present** Yakama Indian Nation  
Title: Fisheries Biologist

Assists and supervises fish enhancement/supplementation projects done by the Yakama Indian Nation. Projects include Yakima fall chinook, Yakima coho, Mid-Columbia coho, K-Basin fall chinook, and sturgeon enhancement programs. Primarily responsible for: 1). 1). determining biological criteria for fish; 2). Scheduling fish rearing activities. 3). Monitoring success of rearing facilities. 4). Developing plans for future improvements to hatcheries/acclimation sites. Assist in preparing and managing yearly budgets.

**9/89-6/97** Yakama Indian Nation  
Title: Fish Culturist IV

Worked at Bonneville Fish Hatchery under the BPA training and education program. Duties included activities involved with salmon hatchery operations. Spawned adult chinook brood, worked in the egg incubation building assisting in salmon egg fertilization, enumeration and propagation activities. Worked with the juvenile salmon through the rearing period from the fry to the smoltification stage. Performed daily maintenance of hatchery facility.

Worked for YIN on fall chinook and coho acclimation projects. Surveyed potential rearing sites and assisted in designing acclimation/hatchery sites. Responsible for developing feed schedules and other rearing activities. Monitored all aspects of fish culture related to the project including fish health and growth. Other duties included: 1). 1). Snorkeling surveys 2). Electrofishing for juvenile and adult brood salmon 3). Evaluating adult capture techniques. 4). Assessing stream habitat 5). Spawning ground surveys.

## **Section 10. Information/technology transfer**

The technical information resulting from this project (and its component tasks) will be distributed in the following ways:

Where applicable, task specific, annual reports will be submitted to Bonneville consistent with the contract requirements and Bonneville will distribute copies to all individuals and agencies on its mailing list.

Excerpted data will be appropriately formatted and submitted to the Northwest Aquatic Information Network (StreamNet) and made available to the public via the Internet.

As an element of the YKFP, the objectives and findings of this project will also be entered into the YKFP home-page on the Internet. This home-page is currently under construction, and should be operational some time in 1998. The kind of information posted to the YKFP home-page will differ somewhat from that posted to StreamNet. Specifically, the YKFP Internet site will contain more detailed and site-specific information than that in StreamNet, which has a regional perspective and therefore aggregates data in standardized units of larger geographic scope. There will also be more different kinds of data posted to the YKFP site than can presently be accommodated by StreamNet.

The results of this study will also be presented and critiqued in a (public?) work shop hosted by the YKFP, the "Project Annual Review". The Yakama Indian Nation can be contacted for abstracts (transcripts?) of presentations made at this work shop.

Information pertinent to monitoring natural production and ecological interactions of species targeted by the YKFP will be incorporated into the appropriate species' Monitoring Plan.